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Ecology, sustainability and traditional wisdom

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ABSTRACT

During the last few years the world has witnessed severe climatic conditions, be it in the form of unprecedented droughts or devastating floods, tornadoes, landslides along with major earthquakes and Tsunamis. Are these natural calamities natural and normal or are these the manifestation of man's adverse impact on the environment? If the nature and frequency of numerous geo-climatic upheavals that the earth is experiencing is compared to the worst case scenario of the climate change advocates, the resemblance seems amazingly similar. A plausible explanation for this could be the fact that mankind does not know how to reign in its need for continuous economic growth without adversely affecting ecological sustainability! This problem of achieving and maintaining sustained economic growth seems to be a problem that is unique to the modern post industrial economy. It is being increasingly realized that the ancient civilizations may have economic systems and practices that was based on living in harmony with nature. Hence, there is a growing clamor to learn from the wisdom of the ancients and incorporate their ideas and practices or in other words learn from the philosophies that have stood the test of time.

That tribal wisdom may be better equipped to deal with natural calamity was vividly displayed a few years ago in India. When the massive Tsunami of December 26th, 2004 ravaged Asia, one of the hardest hit region was the remote chain of some 500 islands known collectively as the Andaman and Nicobar. Inhabited by hunter gatherer tribes that have little contact with the outside world, anthropologists initially feared the tribes could have been completely wiped out. However it was soon discovered that the tribal community used their ancient knowledge of nature to escape the Tsunami. One of the tribes that lives there are the Onge. They are estimated to have lived in the islands for 30000–50000 years. Numbering some one hundred individuals, they are on the verge of extinction. However, in the Tsunami, they suffered no casualties as their folklore speaks of large waves that follows earthquakes, so all of them retreated to the high grounds.

As north east India is home to numerous traditional societies that have followed old age practices up to the modern times, this region could make significant contribution to the sustainability discourse. Tribal communities and indigenous religions the world over are accepted repositories of ancient knowledge and wisdom. Significantly, with the tribal communities, such knowledge systems are living traditions. Thus such living knowledge systems could be an important source of guidance for modern man in his quest for sustainability. For the purpose of this paper, the Khasi sacred forest were used as a case study to understand what lessons it can offer in our quest to conserve our forests and also achieve sustainability.
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1. Introduction

During the last couple of years, different countries of the world have borne the brunt of severe climatic conditions, be it in the form of unprecedented droughts or devastating floods, tornadoes, landslides along with major earthquakes and tsunamis. Are these calamities natural and normal? Or should one accept the argument that these calamities have been invited by our own actions and inaction that has resulted in severe climate change. Looking at the nature and frequency of numerous geo-climatic upheavals that the earth is experiencing it appears that the worst case scenario in the climate change advocates seems to be coming true. As observed by Stephan Faris, the events of first decade of the century opened the eyes of the world to climate change. While Hurricane Katrina devoured New Orleans, fire often engulfed the Amazon and polar

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bears drowned in the melting Arctic ice while Europe simmered in unprecedented heat waves and America was struck by drought and the Glaciers were melting like never before! [Faris (2009)]. The question which arises here is that if mankind is aware that its actions are directly contributing to climate change, why is it that corrective measures are not being taken? The answer probably lies in the socio-political and economic system created by man that requires the achievement of a perpetual growth cycle which is based on ever growing production and consumption. Sheffield (2002) makes an interesting assessment regarding the future of a world in which both population and energy usage continually increases. In the environmental sustainability discourse, while arguing that the availability of cheap and easily movable fuel is important, it is also a fact that it may be essential for the developing regions to increase their energy capacities, to improve their standards of living, and to stabilize their populations. Yet long term ecological sustainability concerns would have to be addressed. Wilk (2002) tries to make an interesting correlation between cultures and energy use. The possibility of placing energy consumption within the broad context of culture to broaden the understanding of sustainable energy problem opens up new perspectives. It examines the evolution of energy use, origins of consumer culture, dynamics of consumer society, cycles of consumption, and problems of over consumption. It is shown that increase in energy efficiency is normally offset by an increase in consumption. Furthermore, modern culture and consumerism are expanding throughout the world. It is argues that different solutions to energy problems will have to emerge, each within a different historical, economic, political, and cultural context. Unfortunately, such a growth paradigm may not be possible to achieve in a scenario where the earth resources are limited as opined by the work of Club of Rome. Thus it is apparent that the problem stems from the fact that mankind does not know how to reign in its need for continuous economic growth without adversely affecting ecological sustainability.

Concerns about ecological sustainability has steadily grown especially in recent decades [Bookchin (1987); Lemons et al. (1997)]. Thankfully, the focus has not been confined to short term issues but on medium and long long-term environmental, social, and economic implications spanning both localized situations as well as global concerns [Daly et al. (1994); Goodland (1995)]. However, though the terms sustainable development and sustainable communities have gained wide currency [Mazmanian and Kraft (2009); Bank (1997)], at the same time, a huge amount of ambiguity continues to be associated with the word sustainability itself! [Holmberg and Sandbrook (1992)]. It has been acknowledged that sustainability is a multifaceted concept that may defy simple explanations [Gupta and Raman (2009); Hahn and Figge (2011)]. Probably, the best acceptable explanation can be traced to the statement in the report (1987) on environment and development which stated “Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs”. Although defining sustainability cannot be done in simple and straightforward terms [Pounder (2011)] yet it is generally seen to be aligned with the concept of sustainable development which in turn is based upon the concept of the triple bottom line or 3 P s consisting of people, profit, and planet [Goodland (1995); Elkington (1998)]. This has led to the development of a more structured view of sustainability where the equation seems to be more clearly enunciated. While the concepts of sustainability and ecological integrity has often been interpreted in differing ways depending on the context [Dobson (1995); Pepper (2002)], yet the major emphasis has always been the judicious use of natural capital and the reciprocity between humanity and nature. Jabareen (2004) opined that the term sustainability originally belongs to ecology but when the concept of development is added to it the paradigm of ecology is shifted towards society and economy [Reboratti (2000)]. This contention is further buttressed by Wolfgang Sachs when he opines that the concept of sustainability holds the promise to bring harmony between ecological sustainability and economic development interests. The efforts, especially of the last two decades have been to conceptualize sustainable development by stressing on the economic and social growth through science and technology without adversely impacting the ecological balance of the universe. The missing link in this effort could be the lack of incorporation of the existing traditional wisdom of indigenous communities in the sustainability debate.

Interestingly, studies on sustainability clearly reveals that the production and distribution systems of ancient civilizations and the philosophical basis of these were based on what constitutes the modern day best practices of sustainability!

The fact is that the basic economic model has become the de facto model for the modern world with an upward rising growth curve in perpetuity. This is sought to be achieved by ever increasing consumption which has to be equally matched by production. However, the bottleneck to this model is the limited supply of natural resources. While non renewable natural components such as minerals are fast running out, others natural resources are being depleted at a rate faster than their ability to replenish. This has created legitimate fears about the ultimate and inevitable collapse of the economic system. Under the circumstances, it has been the endeavor of researchers to seek knowledge and answers from older civilizations and gain from their traditional wisdom. A case study of the Khasi sacred forest is part of this effort constitutes the primary purpose of this paper.

A key finding from this study is that the traditional knowledge systems as seen from the study of the Khasi traditions and examination of the Khasi sacred forest holds important lessons for overcoming some of the major problems of the present world. For instance, one may allude to traditional system of forest management which consist of minute understanding of natural cycles and co-relation between microorganisms and plants etc. It also throws light on the medicinal value of particular tree species and their probable uses. However, much of the traditional wisdom has to be corroborated by scientific studies. As a future direction to these findings, active research into traditional belief systems backed by scientific studies can provide answers to many a pressing problem being faced by mankind. These could effectively lead to development of sustainable systems of growth where economy is properly aligned to ecology.

Conceptually, the approach of this study can be understood with Fig. 1.

The rest of this paper is structured as follows - Section 2 gives the purpose of this study, Section 3 elaborates the methodology, Section 4 discusses the Khasi sacred forests from the prism of traditional wisdom, Section 5 discusses the findings and Section 6 gives the conclusion and future direction of this research work.

2. Purpose of the study

The problem of achieving and maintaining sustained economic growth seems to be a problem that is unique to the modern post industrial economy. Along with this is the growing realization that the world is fast running out of resources that is required to maintain the perpetual growth cycle. This has resulted in the mainstreaming of concepts such as sustainability and sustainable development. With sustainable development being understood as the symbiosis between ecology and economy, what is also being realized is the difficulty of achieving this equation. This has led

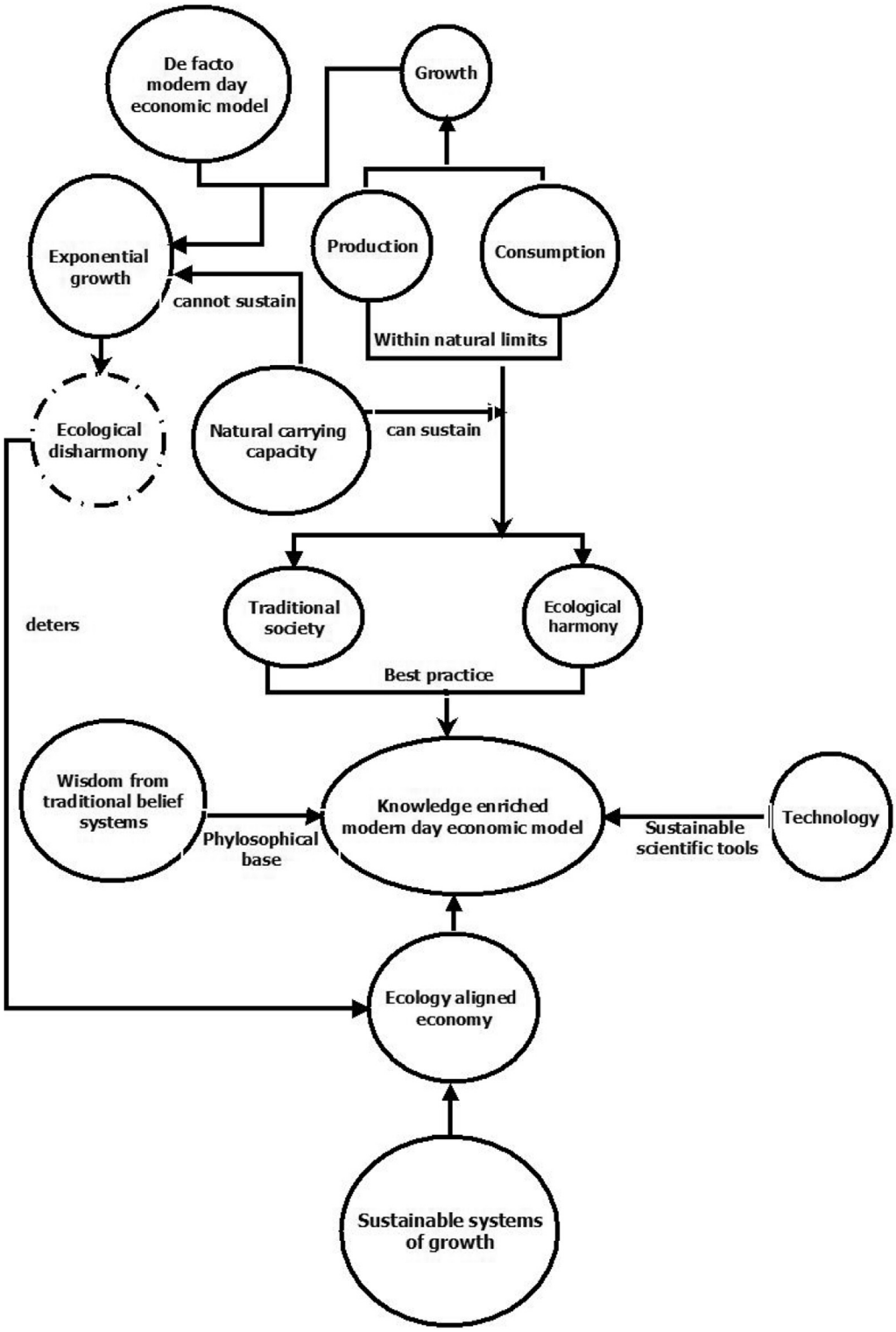

Fig. 1. Sustainable system for growth.

researchers to study the ancient civilizations which may have created economic systems and practices that was based on living in harmony with nature. The Khasi tribe, which belongs to the Mon Khmer group of races can be found in the north east of India. One of the earliest tribes to have migrated to this region, the Khasis have a set of unique social and cultural practices. It is one of the few matrilinial tribes in the world that traces descent from the mother. The traditional religion too is essentially a philosophy of living in harmony with nature. The paper is aimed at critically examining the concepts of sustainability and sustainable development and contrast these concepts to the living knowledge system of the Khasi tribe and see if it could be an important source of guidance for modern man in his quest for sustainability.

3. Methodology

The methodology for the study included both primary and secondary sources. Primary research consisted of a case study conducted on the largest sacred forest in Meghalaya, the Mawphlang Sacred forest which is the best preserved traditional forest in the entire region. It is located some 25 km away from Shillong and have an area of 76.08 acres. The existence of numerous sacred forests was noted way back in 1908 in the Imperial Gazetteer of India which stated that the Khasi hills are "clothed with clumps of oak, chestnut, magnolia, beech and other trees, which superstition has preserved from the axe of the wood cutter". Sadly, most of these forests that were reported in the Gazetteer of 1908 are no more in existence. Perhaps the best known of the Sacred Forest that continues to survive is that of Mawphlang, which was a small village when the British established their headquarters at Cherrapunjee or Sohra. The Mawphlang sacred forest is at an average elevation of 6000 ft and is situated at 25.34° North Latitude and 91.56° East Longitude. The verdant sacred forest itself is a thickly wooded area surrounded by a rocky grass covered landscape. The sacred grove is looked after by a clan known as the Lyngdoh Mawphlang and is under the overall care of the Lyngdoh or the priest of this clan who stays nearby this grove. The rituals are performed inside the sanctum sanctorum of the grove but the frequency of such rituals are decreasing day by day. The highest point of Mawphlang is the Ring Kiew Mawiong which is at an altitude of 6138 feet. From atop this mount can be seen the Lum Shyllong to the east, the Lum Rableng to the south east the Lum Swer to the south the Symper Kma wan in the west and the Lum Dieng iei in the north East. The Lum Ring Kiew Mawiong though being the highest of the peaks is a mountain consisting of very gentle slopes.

Extended field trips during 2004-5 and then again in 2015-17 also included a number of interviews and discussions with the secretary of the Mawphlang village, the Lyngdoh or the Priest of the Forest, the local guides who take people inside the forests, the village headman, and the locals of the surrounding villages. Interestingly, the audio visual documentation of the forest resulted in the author scripting and directing a 25 min documentary on the forest which was broadcast in 2006 by the state owned Television Channel in India, Doordarshan.

Secondary sources included books, articles and journal publications. Attempts were made to posit the Khasi traditional knowledge systems by comparing it to Traditional Ecological Knowledge Systems (TEK)of Adi and the Monpa tribes of Arunachal Pradesh in India, and the first nations in Canada.

4. The Khasi sacred forests

Tribal communities and forests seemingly share a symbiotic relationship that extends from providing the basic necessities for the sustenance of the community to serving its temporal requirements and beliefs. While the forest itself is considered to be the abode of gods and spirits, certain plants, animals rivers and rocks, could be deified and worshiped. This created a relationship of mutual benefit in which forests were used for survival of man, and in turn man looked after the upkeep of the forests [Kharkongor and Tiwari (2017)]. This constitutes a good example of a symbiotic relationship of mutual benefit based on respect. Not surprisingly, select forests, in different parts of the world has been consecrated as sacred and treated with veneration and respect. In the case of India and especially in the tribal regions of central and the north eastern region, there were a number of forests that were designated as sacred. However, with the onset of modernity, most of these forests have all but disappeared. Some of these can still be found in the Khasi hills of Meghalaya. Scientific studies reveals that such sacred forests are bio-diversity hotspots and a treasure house of unique flora and fauna species [Tiwari et al. (2010)]. Undoubtedly, these constitute one of the best examples of ancient wisdom in ensuring ecological sustainability. The amazing feat of ensuring the survival of these forests through the centuries has been achieved not through the patrolling or armed guards, but though an enduring belief system. Like the world view of tribes in different parts of the world, for the Khasi too, forests, rivers and trees were thought to personify gods and spirits. These were venerated and worshiped, and their places of dwelling, be it forests or caves were considered as sacred. Such places or objects, treated as the abode of the gods were not only revered but also worshiped and protected. The strength of tradition certainly succeeded in ensuring that forests designated as sacred were protected and preserved. This preservation was certainly helped by the belief system that made it taboo to pick up anything, which included even a tiny leaf and carry it out of the forest! The belief system also firmly proclaimed that any disobedience of this would result in serious consequences such as ailments and disease. Interestingly, it was also believed that unless the transgression was atoned for through prescribed rituals, it would prove to be fatal. In addition, veneration to the deities was also prescriptive. It was a normal practice to pray to them in order to pacify or seek the blessings of the forest gods. The forests spirits were also appeased through rituals and sacrifices and in turn the spirits ensured the welfare of the people. Today, such beliefs are often ridiculed and derisively dubbed as animism and superstition. Moreover, due to the relentless pressure of more organized religions, traditional belief systems are also fast disappearing. With them are disappearing a way of life that was instrumental in preserving the sustainability of human civilization. As a case in point may be cited the example of these sacred forests of the Khasi tribe. In the not too distant past, many forests of the Khasi and Jaintia hills were designated as sacred. In fact, even the name of the capital city of the state, Shillong, is derived from the hill U Lum Shyllong, where the present day Shillong Peak is located. It was considered a sacred forest, where resided the spirit of the guardian deity, U Lei Shyllong [Gurdon (1987): 115]. The location of this sacred forest seems to have been arrived at after careful deliberation. As an example, the Laitkor forest range which housed the sacred forests are today recognized as an important rain catchment area for the Shillong valley. It is due to this forest that most of the perennial springs that supplies crystal clear water to a large part of Shillong round the year owe their existence. Today, with the denudation of these forests, numerous hill springs are drying up and water scarcity has become much more common. Sadly, in a landscape that once boasted of many such forests, only a few survives. Of those that exists, perhaps the most celebrated is the one located at Mawphlang. It is considered to be an ecological and biodiversity hotspot. It is assumed that the core forest area has remained undisturbed for over five hundred years and is home to various exotic species of flora and fauna. Withstanding the tremendous pressure of population and ever growing hunger for resources, perhaps the only reason that the forest has survived is because it is designated as sacred. It is the respect of the people towards the Khasi faith and the vibrant belief system of the indigenous people that continues to protect it. This verdant forest is also considered a rain catchment area and probably, it is no co-incidence that much of Shillong's growing water supply needs are met from the Mawphlang dam, fed from the nearby perennial river ! The pristine sacred forest of Mawphlang is home to an amazing range of flora and fauna. Much of the species that can be found there is yet to be properly documented. None the

less, it is accepted that these forests are home to many exotic and endemic species. A recent discovery that greatly excited the scientific community was the medicinal plant known as the Taxus Baccata. In recent times, the plant had become extremely important for the medical world as it was a rare plant species that had a huge anti cancer property. Interestingly, in the Khasi tradition, this tree was always venerated and called the Ksesh Blei which may be literally translated as god's tree or the sacred tree [Kakoty (2012)]. It is certainly worth asking as to why was it so named? Was it because the ancients had knowledge about its medicinal properties? Wisdom of the traditional societies may have the answer to many a problem of modern day civilization. It is time we learn from their wisdom.

Khasi traditional wisdom would certainly encompass a wide gamut of knowledge systems. The two essential postulates of Khasi philosophy and world view are the concepts of *tip briew tip blei* which may be translated as know your fellow being to realize god and the other is the injunction of *ka kamai ia ka hok* or ensuring that ones livelihood is earned only through righteous means. Out of these have grown an entire philosophy of life and living that incorporates respect to nature and specific rules of conduct which includes conservation of consecrated forests as sacred forests and natural healing systems, through use of herbs, plants and incantations. The concept of property too is extremely interesting. Most forests, rivers and lakes would be held as belonging to the commons. Individuals who displayed signs of extreme prosperity were viewed with suspicion as worshipers of the snake devil or the *thlen*. As this devil could be propitiated only with human blood, the suspected devil worshipers often face social ostracism if not outright violence. Probably such practices evolved to discourage extreme social disparities from emerging. Though much of the knowledge of traditional healing methods and systems of man-nature interaction have faded due to lack of patronage, yet, strong remnants remain especially in the rural areas. The system of commons seem to have been greatly usurped by the elite of the Khasi society.

5. Discussion

There is a growing clamor to learn from the wisdom of the ancients and incorporate practices and philosophies that have stood the test of time. The need to incorporate traditional knowledge was brought home after the Tsunami of 2004. When the massive Tsunami of December 26th, 2004 ravaged Asia, one of the hardest hit region were the remote chain some 500 islands known collectively as the Andaman and Nicobar. These islands are predominantly inhabited by hunter gatherer tribes that have little contact with the outside world. As the Tsunami unleashed major damage in the developed regions, anthropologists feared that the backward tribes of this region may have been completely wiped out. Thankfully, researchers after the Tsunami discovered that the tribal community used their ancient knowledge of nature to escape the Tsunami. For instance, one of the tribes are the Onge. They are estimated to have lived in these islands for some 30000–50000 years. Today their population stands at some one hundred individuals and they are on the verge of extinction. However, in the Tsunami, they suffered no casualties as their folklore speaks of large waves that follows earthquakes. So true to their tradition, all of them retreated to high grounds after the earthquake. This ensured that they escaped the violence of the Tsunami that followed. It is apparent that the aboriginals know about Tsunamis and they also know how to deal with them, as evidenced in news reports [Bhaumik (2005), Geographic (2005)]. Juxtaposing traditional wisdom in the context of the sustainability discourse reveals that though traditional wisdom does not specifically deal with sustainability, yet it shares a close affinity with the basic postulates of sustainability. For instance, traditional communities and indigenous religions the world over are accepted repositories of ancient knowledge and wisdom, as has been discussed and illustrated in Section 4 while discoursing on the Khasi sacred forests. Significantly, with the tribal communities, such knowledge systems are living traditions. Thus such living knowledge systems could be an important source of guidance for the modern man in the quest for sustainability.

Ecology and environment are two of the facets that have been driving the sustainability discourse to a great extent. Faris (2009) and others have clearly demonstrated the growth of conflicts, unrest and wars due to ecological reasons. An interesting article by Homer-Dixon et al. (1993) and others in Scientific American shows how natural resource scarcities and distributive inequities often leads to environmental degradation and violent human conflicts, especially in developing countries. It cautions about the possibility of worsening environmental conditions and escalating violence in coming decades, and recommends increased international cooperation to provide for sustainable development. Another writer MartÃnez-Alier (1997) also dwells on ecological distribution linked conflicts throughout the world. He shows the linkages between local environmental movements and global ecological problems. There is also the growing trend of linking international ecological concerns such as the struggle against toxic imperialism. Others seek to link issues of environment to issues of ecological justice. It has also been argued by writers such as Low and Gleeson (1998) that since the environment is fundamentally shared by all living entities any attempts to speak of environmental justice would entail the recognition of the fundamental right of all living creatures to the same environment. Bryner (2002) advocates that the understanding of environmental justice and ecological sustainability has to be seen from the same prism. Touche (2002) too has emphasized on linking environmental justice with ecological sustainability. According to Goodland (1995) environmental sustainability seeks to sustain global life-support systems indefinitely. In specific terms, this would entail achieving environmental sustainability by stabilizing and also reducing the environmental burdens [Singh (2009)]. These environmental burdens could be global warming, depletion of stratospheric ozone layer, pollution of sea and rivers, noise and light pollution, acid rain and desertification [Ramlogan (1997)]. Constantly growing industrialization and globalization along with increasing numbers of Multinationals (MNCs) around the world are mainly held responsible for environmental damages in several ways [Kumar et al. (2011)]. Now it requires organizations to address issues related to environmental degradation in order to develop a sustainable vision [Walker (2008)] and achieve competitive advantage in long-run.

While seeking solutions to the growing sustainability issues, there is a trend of reexamining the body of knowledge known as Buddhist economics. This is seen as one of the major repositories of traditional wisdom. The cornerstone of the concept of Buddhist economics is probably the concept of right livelihood. The concept of livelihood is one of the primary component of the Buddha's noble eight fold path, as well as a postulate for much of its philosophical moorings. As a concept it is often sought to be compared with ethical behavior both individually and in dealings with others. When applied to business, ethics and business are not seen as complimentary forces and hence becomes difficult to incorporate into mainstream economics. For the modern economist, the standard yardstick of measuring development has been the standard of living which assumes that a man who consumes more is better off than a man who consumes less. A Buddhist economist

would consider this approach excessively irrational, since consumption is merely a means to human well being, the aim should be to obtain the maximum of well being with the minimum of consumption. This also succeeds in focusing attention on the importance of understanding sustainability vis-a-vis development, growth, neoclassical economics and market liberalization, in addition to ecology and environment. An interesting study was done by Singh et al. (2010) and others to look at the traditional knowledge and related bio cultural resources among Adi and Monpa tribes from Arunachal Pradesh and Khasi tribe from Meghalaya. Other studies [Kakoty (2012)] have looked at traditions followed by tribes such as the Apatanis of Arunachal Pradesh, the Angamis of Nagaland and the Khasis of Meghalaya. All these studies point to the prevalence of traditions and practices that have not only stood the test of time but could provide viable answers to many a modern day problem and enhance the well being quotient of sustainability. Natural methods of soil regeneration and enrichment among the Angamis and the Apatanis are certainly worth examining. Among the Khasis, the huge number of patients flocking to herbal healers is testimony to the efficacy of the traditional knowledge system. While many of the herbal healers are dying without passing on their knowledge to the next generation, there is also the lack of institutional mechanisms that would facilitate the transfer of such knowledge. There still exists a lot of animosity and antipathy between the traditional systems of healing and the allopathic systems that have become mainstreamed. Yet, there have been cases where traditional bone setters have used modern devices such as X rays to help in their diagnosis and treatment. But such instances are few and far between. What is needed is a Systemic approach to learn from the wisdom of traditional knowledge systems. Unfortunately, communities and their traditional practices and knowledge systems are under increasing pressure. For instance, knowledge exchange in tribal societies follow the oral route as they are pre literate. This was achieved through an organizational structure called the Bachelor Dormitories. Known as Morungs among the Nagas or Nokpante among the Garo tribes, the youth of these tribes spent their time here under the supervision of elders, learning crafts and picking up lores and stories packed with wisdom. Today, these have all but disappeared and hence the very vehicle for sharing community knowledge and values also disappeared. This leads to the natural concern that the disappearance of the *true* elders will lead to complete loss of traditional knowledge. However, some opine that this pessimism may be somewhat misplaced [Sherry and Myers (2002)]. In spite of facing challenges from numerous quarters, traditional knowledge systems are still vital and active. At the same time, it is also a natural process that subtle changes are incorporated and change in tradition also affected [Johnson (1992)].

Constanza and Daly (1987) emphasizes the crucial distinction between the concept of growth which usually implies a quantitative increase in size and the concept of development that implies a qualitative improvement in organization. The authors further argues that quantitative growth is not sustainable, but qualitative development may be sustainable. The biological-physical limits and the ethical-social limits to growth need to be considered. The problem of sustainability may presuppose utilization of the moral knowledge inherited from the past. Holmberg and Sandbrook (1992) review the problems in defining sustainable development and goes on to identify inter generational equity as a generally recognized priority. At the same time, they also acknowledge that important questions regarding economic development, social welfare, and the environment remain unanswered. Some of the major dilemmas include limits to quantitative economic growth, measurement of qualitative development, trade-offs between human and environmental systems and relationships between sustainability and democracy.

Sollner (1997) examines the major weaknesses in the neoclassical version of environmental economics and argues that neoclassical economics is deficient because the value theory, copied as it were, from classical mechanics is incompatible with the entropy law of thermodynamics. To achieve the proper integration of thermodynamics into environmental economics it would require a fundamental restructuring of economic theory itself. The author also stresses the importance of entropy in seriously addressing the energy supply problems and how thermodynamics could serve a heuristic function in identifying shortcomings of neoclassical economics. Deleage (1989) too was unsparing in his criticism of both capitalism and socialism in evaluating concepts of energy and the relationship between humanity and nature. He looks at how nature is finite, how economic activity is essentially entropic in character and what is the linkage between exploitation of nature and exploitation of humans. The author discusses the systems of production that were born of the industrial revolution, and highlights how capitalism is destroying nature on a planetary scale. At the same time he finds fault with the socialist system for having equally ignored civilizations ecological and thermodynamic constraints. Interestingly, prior to the enactments of environmental legislation in 1970s, it was absolutely legal to pollute the natural environment [Rogers and Hudson (2011)]. Unless we revisit the basic postulates of economics, it will be difficult to incorporate sustainability into the development model in any meaningful manner.

Linking growth rates to development has always been problematic. It is also accepted that development in order to be meaningful has to be sustainable. Though it is argued that market liberalization would lead to higher growth rates and thereby propel development, the reality has been different. Taylor and Pieper (1996) provides an excellent critique on the outcomes of the market liberalization principles known as the *Washington Consensus*. Initiated in the 1980s to guide the stabilization and adjustment programs of the International Monetary Fund and the World Bank, these measures did have some success in initiating conventional growth but failed miserably in eradicating either poverty or inequality, and improving gender relations, education, and human health. A similar approach can be seen in Beckenbach (1994) where social costs of structures and reproductive patterns that are typical in developed capitalist countries are evaluated. The author indicates the shifting of social costs from individual economic agents to society is common. The author sorts through definitions of social costs, theorizes social costs in context of capitalist production, analyzes determinants of social costs, argues social costs are both monetary and non monetary phenomena, provides a classification of social costs, and concludes with implications for decision making. With regard to energy, the discussion highlights treatment of energy as a commodity, waste of energy, burdens of energy use on humans and nature, and government involvement in energy markets.

The modern parameters of development measurement, skewed as they are towards measurement of GDP/GNP, ensures that the modern industrial societies easily appear more developed than traditional societies. Goodland makes a strong case for distinguishing environmental sustainability from social sustainability and economic sustainability. While environmental sustainability is seen in terms of maintaining natural capital, there is the persistent effort to link the crucial issues of growth, its limits and scale with sustainability. The failure to address intra-generational sustainability in the present will make it more difficult to achieve inter generational sustainability in the future. In other words, short term growth cannot replace long term sustainability. Daly et al. (1994) critiques standard economic theory and bemoans the fact that

conventional economics has led humanity toward environmental catastrophe. They focus on the discipline of economics as a deductive science with huge limitations. Instead, what is presented is an alternative approach to the subject which would be largely people centric. When one widens the scope of the discourse and include concepts such as quality of life and the happiness index, the equation could significantly alter. Heinberg makes an interesting observation when he points out that in the scenario where the nation's economic health, the GDP, is calculated in terms of monetary transactions, a country which has happy families is not reflected in the GDP. But in case of the country suffering a war or a natural disaster, the subsequent increase in monetary transactions would boost the GDP! [Heinberg (2011): 40]. It is an accepted fact that after Bhutan successfully argued for the inclusion of what has been termed as the happiness quotient into the development paradigm, it resulted in a significant and qualitative change in the understanding of development measurement indices [Lloyd (2012):171]. In a couple of years, the happiness index has become an integral part of the development measurement indices being adopted all over the world and is gradually emerging as a corner stone of the development debate. Unfortunately, there still does not exist a model for *prosperity without growth* [Sanwal (2015): 31]. After the concept of happiness established itself as an important component of measuring development, it was hardly surprising that other qualitative concepts soon followed. Of these, the two major concepts that slowly gained ground in developmental economics are sustainability and quality of life. Sustainability slowly emerged as the key focus of the modern world especially after the World Commission on Environment and Development known as the Brundtland Commission, published its report in 1987. Following this, the United Nations adopted it thereby bringing to the center stage the new paradigm of the three pillars of economic growth, social equality and environmental sustainability [Muff et al. (2013): 4]. However, the quality of life debate is yet to develop universally accepted measurement indices. None the less, what is pertinent is that the concept of sustainability would necessarily encompass the quality of life component within its discourse. It is seen in the traditions of indigenous communities that the well being of the individual as a part of the larger ecosystem is primary. Incorporation of such a philosophy in co management of environment has produced good results. Studies show that conservation efforts could be more effective with the inclusion of local interests [Freeman (1997)]. Unfortunately, the goal of integrating traditional knowledge systems with state policies has proved elusive. In some cases, co management has succeeded in improving the level of communication and understanding between aboriginal and non aboriginal groups [Osherenko (1988)] and has even emerged and functioned as a mechanism for dispute resolution. However, in the end it is also apparent that Western science and state management priorities and procedures tend to predominate. Aboriginal people have found scanty acceptance for their traditional knowledge and ideology in bureaucratic institutions [Nakashima (1991)]. Sherry and Myers (2002) has identified two models of resource management that are in active use throughout Canada, the aboriginal system and the state system. Several authors have characterized and compared these two models [Osherenko (1988); Berkes (1994); Johnson (1992); Dyer (1994); Kofinas (1998)]. Aboriginal management is a local or regional-level system based on customary authority, traditional ecological knowledge (TEK), and communal management principles [Kofinas (1998)]. makes the interesting observation that the local aboriginal systems of management often reduces information into useful knowledge through the judicious conjunction of their distinctive worldview, cultural practices and normative values. It is essentially a system of rules, norms, and customs concerning rights and responsibilities that are intended to govern the behavior of all who partake of resources and their benefits. In addition, traditional management dwells not merely with resource use but also to relationships with the community and the environment. Without a doubt, many of the traditional management systems are under tremendous stress and breaking down under the impacts of modern technology, competition, globalization, education, population growth, and resource depletion [Murphree (1993); Dyer (1994)]. The views of local communities regarding environment and resource use represents only a small part of the learning that indigenous communities have to bring to resource management decisions [Kendrick and Manseau (2008)]. The narratives and cumulative experience of elders provide a wealth of knowledge and interpretive skills to understand subtle nuances that may defy proper explanation in conventional mapping exercises. It has to be accepted that understanding and explaining changes in the environment with any in-depth analysis or geographical context is exceptionally challenging. It is also difficult to differentiate between the signs of adaptive change and that of ecological crisis. Incomplete knowledge concerning studies of vast landscapes is a reality. Applying the generalization from one area to another is often not appropriate. The challenge is even greater in the highly remote areas. Attempts at mapping and discussion of community-based observations are considered essential to understand how best to prevent the negative impact of anthropogenic activities or how to best plan for sustainable land use activities on these vast landscapes [Kofinas and communities of Aklavik Arctic Village Old Crow Fort McPherson (2002); Huntington et al. (2002)].

Traditional knowledge systems have been built with the community as the primary stake holder and a symbiotic relationship between man and nature is it's cornerstone. This model seeks to promote the well being of both the individual as well as the community as opposed to the concept of measuring development through the scale of growth rates and GDP.

6. Conclusions and future directions

Richard Heinberg succinctly sums it up [Heinberg (2011): 2–3], when he says that there are three factors that adds up to a crisis situation looming large - (a) the depletion of important resources coupled with the proliferation of negative environmental impacts; (b) inevitable financial disruption due to the innate inability of the monetary, banking and investment systems to adjust to growing resource scarcity and soaring environmental costs; (c) private and governmental bad debts. The negative environmental impacts essentially arises out of both extraction and over use of important resources. This problem of achieving and maintaining sustained economic growth seems to be a problem that is unique to the post industrial economy. Dixon identities five major areas or concern which he terms as *tectonic stresses* that could emerge as potent threats to the global order. He points to energy scarcity and over dependence on fossil fuel, economic meltdown and resource and income inequities. The other stress factors he elucidates are demographic problems, environmental issues and climate change challenges. He calls upon the need to ensure deep reform and renewal of institutions, social relations, technologies, and entrenched habits of behavior in order to prevent catastrophe. It is being increasingly realized that the ancient civilizations may have economic systems and practices that was based on living in harmony with nature. Christopher Lloyd extrapolates the phenomenon of Hinduism being the longest surviving religion in all human history and talks about its veneration for nature. The deep philosophical basis provided by religious texts such as the Vedas, the Upanishads and the Gita, coupled with the preaching of people like the Buddha deeply influenced how humans found out that it was

possible to adapt its civilization to live in harmony with the natural world [Lloyd (2012): 167].

When one tries to understand and explain the modern day concepts of sustainability there is a growing realization that pre industrial and ancient civilizations could boast of practices that were eco friendly and sustainable. For instance, in the case of the Himalayan region of Ladhak, it was beautifully pointed out that in every grain of Ladhaki life can be seen the Buddhist teachings which decry waste and encourage the efficient husbanding of land and water, an amazing frugality that arises from respect and gratitude for the limited resources of the land [Norberg-Hodge (1991):xii]. Deeper examination of the production and distribution systems of ancient civilizations and the philosophical tenets that supported it, were based on what constitutes the modern day best practices of sustainability. The study of the Ladhaki society by Norberg drew enormous interest and Stuart Hart goes along with the argument that the traditional nature based society, with all its flaws and limitations, was probably more sustainable, both socially and environmentally, for the Ladhakis [Hart (2007):173]. Not surprisingly, of late, there is a renewed interest to research and learn from the wisdom of the ancients and incorporate philosophies and practices that have stood the test of time. It is in this context regions that have considerable populations of traditional communities, such as the north eastern region of India, could make significant contribution to our understanding of sustainability. In this region, there are as many as 217 tribes listed as scheduled tribe [Singh (2008) Reprint):29], though unofficial listing of tribal communities would raise the number significantly. Each community not only speaks a different language but also has unique cultural practices. These communities had simple economies that were essentially in a pre-industrial stage. Many of these communities were also in a pre-literate stage and had world views and belief systems that may be compared to nature worship [Singh (1991): 13–20]. All over the world such communities, their belief systems and religions are recognized as being repositories of ancient knowledge and wisdom. Significantly, with most tribal communities, such knowledge systems are not a part of history but are a living tradition that continue to be practiced. Thus such living knowledge systems are considered to be an important source of guidance for modern man in his quest for sustainability.

Hart makes a strong case for holistic thinking by recounting the phrase “Thinking Like a Mountain” used by Aldo Leopold in his 1949 classic A Sand Country Almanac [Leopold (1949)]. It was used in relation to the phenomena of exterminating wolves which solved the sheep farmers problem in the short run, but led to huge overpopulation of deer, leading to large scale environmental problems. This led to the growth of the idea that one has to incorporate the practice of thinking like a mountain that would entail appreciation of the holistic character of natural systems and the intricate inter connections in the eco system. This had led writers such as Khanna and Palepu (1997) to argue that focused strategies may not really work in the long run. Moreover, It can be seen that though much effort may be expended in building markets as a tool for economic and social development, yet what is often overlooked are the impediments of social exclusion and poverty that prevent growth. Building on data from rural Bangladesh and analyzing the work of a prominent intermediary organization, Mair et al. (2012) discovers some serious institutional voids that contribute actively towards market exclusion and identify two sets of activities—redefining market architecture and legitimating new actors as being critical for building inclusive markets. Trying to understand economic systems through broader perspectives may be important. Inclusive growth would include greater participation, expanding markets and the required critical mass to ensure sustainability. Incidentally, the traditional knowledge systems are extremely democratic and the community character of resource use and management could hold important lessons for policy planners.

In the traditional Khasi belief system, the rules of interacting with nature were well laid down. Natural cycles and seasonality were understood and respected. For instances, certain months in the year were considered taboo for cutting trees or even bamboos. On interviewing some of the elders of the tribe it transpired that certain months were considered unsuitable for harvesting trees and bamboos because timber and bamboo cut in certain months was prone to insect attack. Peter Wohlleben, in his amazing research on tree life alludes to the fact that in certain seasons the water pressure in trees is the highest, such as before the leaves opens up in spring. The water pressure is used to transport large quantities of sugar from the roots to the leaves, buds and blossoms. People and insects take advantage of this phenomenon. For instance, people in USA and Canada use this natural cycle of sugar distribution in trees during this season to harvest the sap from sugar maples [Wohlleben (2016)]. Arguably when the trees devote their entire energy to growth, they surely cut down on their production of chemicals to repel insects! To make worse, the abundant sugar made available for growth would also attract the insects. It is interesting to dwell on the Khasi taboo of cutting tress in particular seasons and link it to this natural phenomenon. The other notable facet of the Khasi belief system is their deep veneration of particular species of trees and plants. Modern research is showing that many of the species that were venerated in the traditional belief system, has medicinal properties. The Khasi sacred forest at Mawphlang is home to a tree locally known as Ksesh Blei, which literally means the God's Tree. This tree is nothing but the wonder tree for fighting cancer: Taxus Bacatta.

What is being noticed in the Khasi traditions is a strong revivalist movement. Known as the Seng Khasi movement, it has revival and propagation of the indigenous faith as its main agenda. With it could emerge a better understanding of its philosophy and appreciation of the traditional knowledge system of the Khasis. An instance of this could be the traditional system of Khasi healing, known as Kynbat, which consists of the use of herbs, animal parts, massage and incantations. While modern medicine may term the practice as quackery, yet demonstrated efficacy of certain treatments holds important possibilities for medical researchers. Certain commandments for social life, such as the principle of *Ka Kamai Ia Ka Hok* which roughly could mean righteous living through right livelihood or the principle of *Tip Briew Tip Blei*, which could mean that realization of God can be achieved by knowing and serving fellow humans. These may be understood as injunctions of life that may be termed as wisdom which emerges out of the traditional knowledge systems. It stands to reason that such take always from traditional knowledge systems and different facets of Buddhist economics, shows the possibility that mainstreaming sustainability could be the way ahead for the global economy. The more important issue in this case is how and in what ways can this route of sustainability be taken by the global economy. The time tested ecological sustainability, as shown to us by the Khasi sacred forests and the traditional wisdom held in it gives us some answers. A dedicated discourse on this is a future direction of possible research.

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